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(54) Method for determining directional correction values

(57) In determining directional correction values the flight path of a projectile is tracked using radar or laser apparatus. In order to ensure that the radar or laser apparatus (2) cannot be detected and located during the tracking operation only two measuring points (7, 8) on the projectile flight path (3) are measured, the first measuring point (7) being situated in the ascending part and the second measuring point (8) in the descending part of the flight path (3). The flight path and thus the impact point can then be determined from the said measuring points (7, 8).

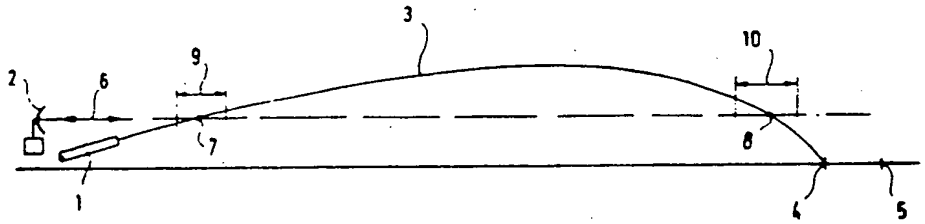

FIG.1

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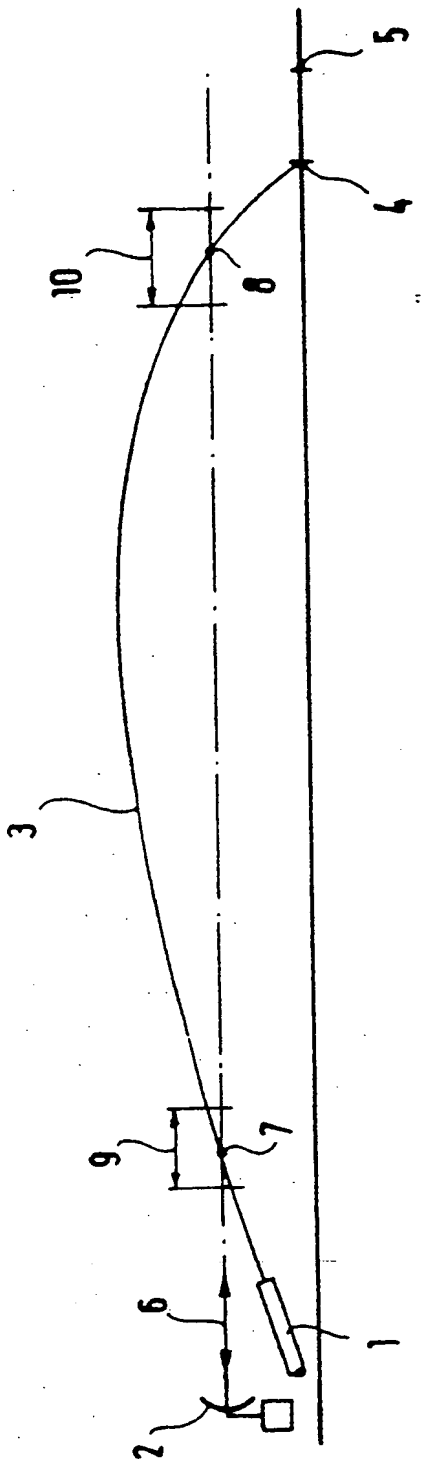

FIG.1

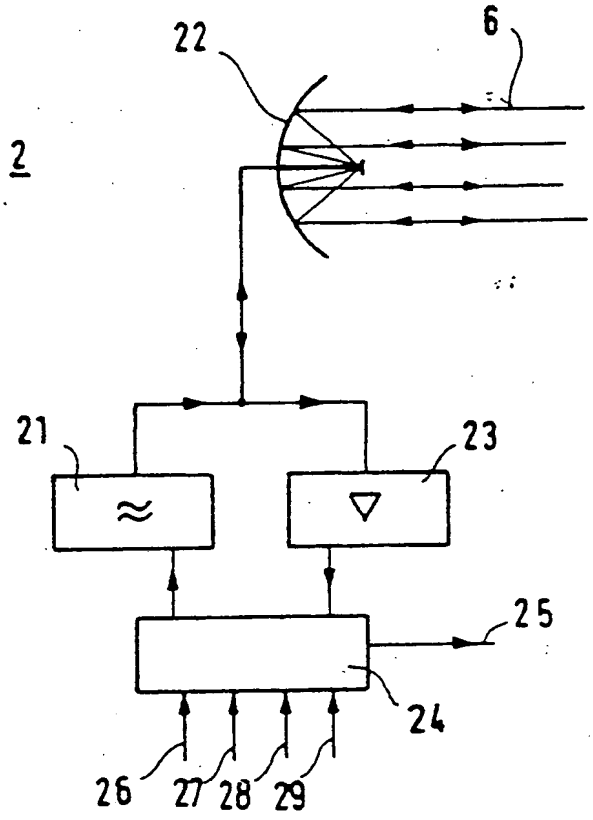

FIG.2

TITLE

Method for determining directional correction values.

This invention relates to a method for determining directional correction values for projectiles.

In known methods of this kind the flight path is tracked for about two thirds of the flight time of the projectile. During this period the radar apparatus emits electromagnetic waves, and thus the radar head and the launcher or gun can be detected.

This invention seeks to provide a method of the kind referred to which makes locations by detection of radar signals more difficult.

According to this invention there is provided a method for determining directional correction values, commencing with the calculation of a directional value for a preselected impact point of a projectile, after which the projectile is fired and the actual impact point determined and the directional correction value assessed from the deviation between the preselected and the actual impact point, in which method two measuring points on the flight path of the projectile are measured, the first measuring point being situated in the ascending part and the second measuring point in the

descending part of the flight path, after which the actual flight path and thus the actual impact point are determined from said measuring points.

This invention is thus based mainly on the fact that the radar apparatus only has to be switched on for two short periods and is thus difficult to detect and locate.

A further advantage is that the energy requirement of the radar apparatus is kept low as the high energy required for a short time can be stored.

Further features of the invention will be described hereinafter by reference to an embodiment by way of example.

In the drawings:

Figure 1 shows a gun barrel and radar apparatus of a tank mounted howitzer, and

Figure 2 shows a schematic diagram of the measuring radar apparatus.

Figure 1 shows the gun barrel 1 of a tank howitzer and the radar apparatus 2 associated therewith, which measures the flight path of the projectile. The actual flight path is referenced 3 and the corresponding impact point 4. The point referenced 5 is the impact point which theoretically follows from the directional value calculation. The radar measuring beam is referenced 6,

the first measuring point 7 and the second measuring point 8. The measuring points 7 and 8 are situated within the measurement expectancy ranges 9 and 10 respectively.

Figure 2 is a schematic diagram of a pulse radar apparatus of a type which can be used for the method of the invention. The item marked 21 is a transmitter, 22 being an aerial, 23 an amplifier and 24 a firing control computer.

The method of the invention is now briefly described in detail:

The directional values are first of all determined on the basis of the preselected values for the type of projectiles and the charge in question and for the desired point of impact and are transmitted to the weapon. The weapon is then test-fired by measuring two points on the flight path 3 instead of continuously measuring the full flight path 3 as hitherto. For this purpose the measuring points determined are 7 in the ascending part and 8 in the descending part.

As the values for the flight path are determined from the firing information, comprising the charge, the type of projectile and the elevation, the transmitter 21 can be controlled by the computer 24 in such a way that it will only emit transmission impulses during the two

measuring expectancy intervals 9 and 10. The real flight path 3 is then determined from the measured values 7 and 8 by using the computer 24 and any necessary directional correction values transmitted to the directional drives via line 25.

The inputs 26 to 29 in Figure 2 serve for the data required for determining the directional values, such as type of projectiles charge, temperature of powder, and the like.

CLAIMS

1. Method for determining directional correction values, commencing with the calculation of a directional value for a preselected impact point of a projectile, after which the projectile is fired and the actual impact point determined and the directional correction value assessed from the deviation between the preselected and the actual impact point, in which method two measuring points on the flight path of the projectile are measured, the first measuring point being situated in the ascending part and the second measuring point in the descending part of the flight path, after which the actual flight path and thus the actual impact point are determined from said measuring points.

2. Method in accordance with Claim 1, wherein the measuring points on the flight path of the projectile are determined by a radar or laser device which transmits pulses only during two preselected measuring expectancy intervals.

3. Method substantially as described herein and exemplified.

4. Apparatus for carrying out the method of any preceding claim substantially as described herein and exemplified.

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